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## Proximal relationships between social support and PTSD symptom severity: A daily diary study of sexual assault survivors

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### Abstract

**Background**—In cross-sectional studies, social support and posttraumatic stress disorder (PTSD) symptoms appear related in that higher levels of PTSD are associated with lower social support, and vice versa. Theoretical models of the causal direction of this relationship differ. Most longitudinal studies suggest that PTSD symptoms erode social support over time, although some suggest that higher social support is prospectively associated with decreases in PTSD symptom severity. It is unclear, though, how social support and PTSD affect each other in the short term. The purpose of this study was to test day-to-day relationships between PTSD and social support to elucidate how PTSD and social support influence each other.

**Methods**—Using 1173 daily observations from 75 college women who met screening criteria for lifetime sexual assault and past-month PTSD, this study tested same-day and next-day relationships between PTSD and social support using mixed models.

**Results**—Within-person analyses indicated that, when PTSD was higher than usual on a given day, social support was higher the next day. Between-person analyses suggested that people with generally higher social support tended to have lower PTSD symptoms on a given day, but average PTSD symptom severity was not associated with day-to-day fluctuations in social support.

**Conclusions**—Rather than eroding in response to daily symptoms, social support might be sought out following increases in PTSD, and when received consistently, might reduce symptoms of PTSD in the short term. Interventions that increase college women's access to social support after sexual assault may thus be helpful in addressing PTSD.

### Keywords

interpersonal relations; stress disorders; post-traumatic; psychological trauma; rape; female; young adult; longitudinal studies; crime victims

Sexual assault (SA) and posttraumatic stress disorder (PTSD) are significant problems among college women. Approximately 32% of college women report SA in childhood or adulthood (Krebs et al., 2016). This prevalence rate is concerning, as SA is associated with increased risk for PTSD (Dworkin, Menon, Bystrynski, & Allen, 2017). Indeed, in college samples, 34-43% of SA survivors meet criteria for PTSD (Frazier et al., 2009; Kilpatrick, Resnick, Ruggiero, Conoscenti, & McCauley, 2007).

Social support, or the ongoing availability of support from one's social network, may affect SA-exposed college women's recovery (Maercker & Horn, 2013; Vogt, Erbes, & Polusny, 2017). Cross-sectional research suggests that social support and PTSD have a negative relationship, in which trauma survivors with more social support have less severe PTSD symptoms, and those with more severe PTSD symptoms report lower social support (Brewin, Andrews, & Valentine, 2000; Guay, Billette, & Marchand, 2006; Ozer, Best, Lipsey, & Weiss, 2003; Wagner, Monson, & Hart, 2016). There is also evidence that social support is associated with PTSD after SA (Littleton, 2010; Ullman, 1999). Social support may be especially important for survivors of SA relative to other forms of trauma due to its interpersonal nature and associated stigma, as well as the ways in which the social support can manifest in specific responses to SA (i.e., social reactions) (Ullman, 2010). Moreover, college women tend to rely on their informal social supporters for help following SA (Fisher et al., 2003).

Theoretical models of the relationship between social support and PTSD symptoms differ with regard to the proposed direction of the causal relationship (Wagner et al., 2016). The social causation model focuses on the impact of social support on PTSD (Wagner et al., 2016). Generally, social support is thought to buffer stress and promote well-being (Cohen & Willis, 1985; Taylor, 2011). After experiencing a trauma, more social support might lead to less severe PTSD symptomatology, whereas less social support might lead to more severe PTSD symptoms. In contrast, the social selection model focuses on the impact of PTSD symptoms on social support, and suggests that PTSD symptoms deteriorate social support (Kaniasty & Norris, 1993; Wagner et al., 2016). These models are not necessarily incompatible; for example, low social support might increase PTSD symptoms, which could further decrease social support.

Longitudinal research has simultaneously tested both the social causation and social selection models. Several studies have found that more severe PTSD symptoms predict future decreases in social support (consistent with the social selection model), but higher reported social support does not predict future decreases in PTSD (inconsistent with the social causation model). This pattern has been observed among US veterans (Carter et al., 2016; King, Taft, King, Hammond, & Stone, 2006; Laffaye, Cavella, Drescher, & Rosen, 2008) and torture survivors in Iraq (Hall, Bonanno, Bolton, & Bass, 2014). Two studies to knowledge have found support for both models. First, research with National Guard soldiers (Shallcross et al., 2016) found that PTSD symptoms and social support reciprocally influence one another over time. Second, a study of Mexican natural disaster victims found support for both models from 12-18 months post-trauma, but only the social causation model was supported from 6-12 and 18-24 months post-trauma (Kaniasty & Norris, 2008). An additional study testing reciprocal relationships between social reactions to SA disclosure

and PTSD symptoms found support for both models (Ullman & Peter-Hagene, 2014). Higher PTSD symptoms were prospectively associated with receiving more negative social reactions, and receiving more negative social reactions was associated with later increases in PTSD symptoms. Despite this relatively consistent evidence for the social selection model, among emergency department trauma admission patients, higher social support predicted subsequent decreases in PTSD symptoms, but PTSD symptom severity did not predict subsequent social support (Freedman et al., 2015), providing support for the social causation but *not* the social selection model. Overall, the social selection model has received more empirical support, although support has been found for the social causation model in certain populations.

It is also important to clarify the nature of the association between PTSD and social support in the short term, as recommended in a recent review (Wagner et al., 2016). Daily assessments of PTSD symptoms and social support could clarify how PTSD and social support affect each other on the same day or from one day to the next. However, social support has been minimally examined on the daily level, with the exception of an earlier analysis of the data used in the current study (Stappenbeck, Hassija, Zimmerman, & Kaysen, 2015), which found that less social support was associated with more same-day drinking among college SA survivors. This study did not examine PTSD symptoms. Research examining daily associations between social support and PTSD symptoms could inform the development of interventions to prevent the erosion of social support.

Thus, the current study tests proximal relationships between social support and symptoms of PTSD among college survivors of child and/or adult SA who met screening criteria for PTSD. Relationships were tested within days and from a given day to the next day. In addition, we explored associations between participants' average levels of social support and day-to-day PTSD symptoms, and vice versa. We hypothesized that same-day PTSD symptoms and social support would be negatively associated, daily PTSD symptoms would be negatively associated with next-day social support, and daily social support would be negatively associated with next-day PTSD symptoms.

## Method

### Procedures

Data were collected as part of a larger IRB-approved study (Kaysen et al., 2014) involving a screening assessment to determine eligibility, a pre-monitoring assessment, and a 30-day period of twice-daily monitoring. Participants were paid \$45 for completing pre-monitoring assessments, \$1 for each of two daily assessments completed, a \$2 bonus for completing both assessments in a day, and a \$10 bonus for completing seven consecutive days of twice-daily assessments.

**Recruitment**—Undergraduate women ( $N=11,544$ ) were randomly selected from a registrar list of undergraduates at a Northwestern university to receive an invitation to complete an online screening survey; 4,342 completed this survey, and 860 of those met study criteria of consuming 4+ drinks at least twice in the past month and having either 1) no trauma history or 2) a history of childhood and/or adult SA at least three months prior to study

participation. Of the eligible participants, 834 completed a pre-monitoring assessment to determine PTSD status and were divided into three groups: 1) no trauma, 2) SA but no PTSD, and 3) both SA and PTSD. Of the 174 who participated in daily monitoring, we selected the 75 participants endorsing both SA and PTSD for inclusion in the current study.

**Daily data collection**—Twice-daily (morning and evening) assessments were completed on researcher-provided personal digital assistant devices.

## Participants

$N=75$  participants completed 1173 daily assessments ( $M=15.64$ , range: 2-28). Mean age was 19.97 ( $SD=1.33$ , range: 18-24). Participants were primarily White/Caucasian (68.0%) and heterosexual (89.3%). Participants reported adult SA only (53.33%), both adult and child SA (41.33%), or child SA only (5.33%). Participants' most recent SA had occurred within six months (25.3%), between six months to three years prior (57.3%), or 3+ years prior (17.3%).

## Measures

**Screening and pre-monitoring assessment**—Participants completed demographic and SA measures at screening and a PTSD assessment at pre-monitoring.

**Sexual assault history:** To assess adult SA, a modified Sexual Experiences Survey (SES; Koss & Gidycz, 1985; Messman-Moore, Long, & Siegfried, 2000) was used. Adult SA was defined as attempted or completed oral, vaginal, or anal intercourse achieved through coercion, force, or incapacitation at age 14+. Participants reported whether they had experienced 18 sexual experiences. To assess childhood sexual abuse, the Childhood Victimization Questionnaire (CVQ; Finkelhor, 1979) was used. Childhood sexual abuse was defined as coercive/forced sexual activity before age 14 with someone 5+ years older. Participants reported whether 11 unwanted sexual experiences, ranging from a sexual invitation to intercourse, had happened to them. Participants were asked, "How long ago did the most recent unwanted sexual experience happen?" Response options were 1 (<1 month), 2 (1-3 months), 3 (3-6 months), 4 (6 months to 3 years), 5 (3-5 years), and 6 (5+ years).

**PTSD diagnostic status:** The Posttraumatic Diagnostic Scale (PDS; Foa, Cashman, Jaycox, & Perry, 1997) assessed PTSD diagnostic status. Participants rated how much each of the 17 PTSD symptoms had bothered them in the past month in relation to their worst SA. Response options ranged from 0 (*not at all*) to 3 (*almost always*). Diagnostic status was assigned to 84 participants who reported at least one intrusive symptom, three avoidance symptoms, and two hyperarousal symptoms (APA, 1994).

**Daily monitoring assessments**—The following questionnaires were completed daily.

**PTSD symptoms:** The 17-item PTSD Checklist for DSM-IV (Weathers, Litz, Herman, Huska, & Keane, 1993) was adapted to assess past-24-hour PTSD symptoms (Naragon-Gainey, Simpson, Moore, Varra, & Kaysen, 2012). Symptoms were assessed in the morning on a 5-point Likert scale from 0 (*not at all*) to 4 (*extremely*). Sum scores were calculated (range: 0-68;  $\alpha=0.91$ ).

**Social support:** One item, revised from a brief measure of social support (Sarason, Sarason, Shearin, & Pierce, 1987; Stappenbeck et al., 2015), assessed social support: “Since the last beep, you have gotten emotional support from your family and friends.” Responses were rated in the morning and evening by participants on a 6-point Likert scale ranging from 0 (*strongly disagree*) to 5 (*strongly agree*). Responses from the morning and the previous evening were averaged to represent past-24-hour social support. Across days, responses were significantly positively correlated with baseline responses to the 12-item Multidimensional Scale of Perceived Social Support (Zimet, Dahlem, Zimet, & Farley, 1988),  $r=0.42$ ,  $p<.0001$ , suggesting convergent validity. Responses were significantly negatively correlated with responses to the daily PCL item assessing whether participants felt distant or cut off from other people,  $r=-0.21$ ,  $p<.0001$ , indicating discriminant validity.

## Analyses

We used participants' score on measures of PTSD symptoms and social support from that day (i.e., the same-day value), as well as their lagged score from the same measures taken from the subsequent day of observation (i.e., the next-day value). Next-day values were used as dependent variables. Two types of independent variables were created for PTSD symptoms and social support to disentangle between- and within-person relationships: the mean of a given participant's daily scores across observations (i.e., time-fixed person mean), and the deviation in score from the person mean (i.e., time-varying daily deviation). Independent variables were transformed into z-scores.

Mixed modeling with a random intercept was used because daily assessments were nested within participants. Separate models predicted 1) next-day PTSD symptoms from same- and next-day social support deviation, same-day PTSD symptom deviation, and person-mean social support and 2) next-day social support from same- and next-day PTSD symptom deviation, same-day social support deviation, and person-mean PTSD symptoms. Time since assault was included as a covariate. The model predicting social support was estimated using a linear mixed model in the R (R Development Core Team, 2008) package lme4 (Bates, Mächler, Bolker, & Walker, 2014). The model predicting PTSD symptoms was estimated with a negative binomial distribution with the glmmADMB package (Fournier et al., 2012; Skaug, Fournier, Nielsen, Magnusson, & Bolker, 2013) in R because daily PTSD symptomatology was a positively-skewed count variable.

## Results

Daily social support ( $M=2.73$ ,  $SD=1.37$ ) and daily PTSD symptoms ( $M=16.10$ ,  $SD=13.40$ ) were significantly negatively correlated,  $r=-0.15$ ,  $p<.001$ . Same-day social support was significantly positively correlated with next-day social support,  $r=0.66$ ,  $p<.001$ , and same-day PTSD symptoms was significantly positively correlated with next-day PTSD symptoms,  $r=0.76$ ,  $p<.001$ . Person-mean social support ( $M=2.59$ ,  $SD=1.04$ ) and person-mean PTSD symptoms ( $M=16.07$ ,  $SD=11.51$ ) had a marginally-significant correlation,  $r=-0.20$ ,  $p=0.09$ .

Model results are summarized in Table 1 and Figure 1. First, in the model predicting next-day social support, same-day PTSD symptom deviation and same-day social support deviation were both significant positive predictors, such that higher-than-usual PTSD

symptoms or social support on a given day was associated with higher social support the next day. Next-day PTSD symptom deviation was a significant negative predictor; that is, having lower-than-normal symptoms of PTSD was associated with higher levels of concurrent social support. Person-mean (i.e., average) PTSD symptoms and time since SA were not significantly associated with next-day social support deviation. Second, in the model predicting next-day social support, same-day PTSD symptom deviation, but not same-day social support deviation, was significantly positively associated with next-day PTSD symptoms, such that having higher-than-usual PTSD symptoms on a given day was associated with higher next-day PTSD symptoms. Next-day social support deviation was significantly negatively associated with concurrent PTSD symptoms, such that having lower-than-normal social support on a given day was associated with higher levels of concurrent PTSD symptoms. Person-mean social support was also significantly negatively associated with next-day PTSD symptoms, meaning that people with generally higher levels of social support tended to have lower PTSD symptoms on any given day. Time since SA was not significantly associated with next-day PTSD symptoms.

## Discussion

Cross-sectional research suggests that higher social support is associated with lower PTSD symptoms (Brewin et al., 2000; Guay et al., 2006; Ozer et al., 2003; Wagner et al., 2016). Longitudinal studies indicate that higher PTSD symptoms are prospectively associated with decreases in social support (Carter et al., 2016; Hall et al., 2014; Kaniasty & Norris, 2008; King et al., 2006; Laffaye et al., 2008; Shallcross et al., 2016), and higher social support may be associated with prospective decreases in PTSD symptoms in certain populations or time periods post-trauma (Freedman et al., 2015; Kaniasty & Norris, 2008; Shallcross et al., 2016). In the first study to knowledge examining day-to-day relationships between social support and PTSD symptoms, results demonstrate that social support and PTSD symptoms are related within a given day and from one day to the next among college women exposed to SA. Findings do not support the social selection model (which suggests that as PTSD symptoms increase in severity, social support decreases) on a day-to-day basis (Kaniasty & Norris, 2008), but instead provide evidence supporting the social causation model (which suggests that higher social support is protective against PTSD) in the short term. In addition, PTSD symptoms evidenced a positive relationship with next-day social support, perhaps due to a mobilization of social support in response to symptoms.

Social support and PTSD symptoms were negatively related on a day-to-day basis: PTSD symptoms were lower on days when social support was higher than usual, and higher on days when social support was lower than usual. Similarly, social support was higher on days when PTSD symptoms were lower than usual, and lower on days when PTSD symptoms were higher than usual. These findings extend cross-sectional studies that have found a negative relationship between PTSD symptoms and social support (Brewin et al., 2000; Ozer et al., 2003) by demonstrating that this relationship is present on a day-to-day level. It is possible that, within a given day, social support can affect PTSD symptoms by, for example, promoting positive coping strategies or more adaptive cognitive appraisals (e.g., reduced self-blame, less extreme views of self and others) (Guay et al., 2006; Wagner et al., 2016). Given evidence that negative social reactions to SA are associated with higher self-blame

and use of maladaptive coping strategies longitudinally (Ullman & Najdowski, 2011; Ullman & Relyea, 2016), it is possible that the absence of negative social support, rather than the presence of positive support per se, is protective against the development and maintenance of PTSD symptoms among SA survivors. Alternatively, social support might be provided at a higher level on days where symptoms interfere with functioning less, either because social supporters withdraw from people in distress (e.g., Rowlands & Lee, 2010), or because people in distress withdraw from their social supporters (e.g., Gutner, Rizvi, Monson, & Resick, 2006). These interpretations highlight the potential short-term benefits of interventions that help patients activate social support or help social supporters respond effectively (Edwards & Ullman, in press). Social support might also be perceived more positively when symptoms are less distressing, or PTSD symptoms might be perceived to be less distressing when social support is higher. Providers could help patients understand how daily experiences impact such perceptions.

Against expectations, when PTSD symptoms were higher than usual on a given day, next-day social support was higher. This finding contradicts the negative relationship between these variables identified in most past research on social support and PTSD (Brewin et al., 2000; Ozer et al., 2003), and suggests that social support and PTSD symptoms might have a different relationship depending on the time frame of observation. Past work suggests that SA survivors report seeking more support when they feel distressed (Dworkin, Pittenger, & Allen, 2016), but this study extends that work to indicate that social support is *actually received* by distressed trauma survivors. Although the same-day results suggest an initial withdrawal from social support when symptoms are higher, survivors might seek more support after this initial withdrawal, or might be more effective in activating support the next day than on the day that they experience distress. This possibility should be explored in future research. It is also possible that social supporters offer support in a delayed manner after observing increases in symptoms.

Results suggest the presence of a negative relationship between overall social support and PTSD symptoms on a given day, in support of the social causation model (Kaniasty & Norris, 2008; Wagner et al., 2016). That is, people with higher social support in the month in which they were observed tended to have lower PTSD symptoms on a given day. In contrast, receiving support on a given day was not associated with next-day PTSD symptoms. When considered along with the same-day negative relationship between social support and PTSD symptoms, these findings indicate that the benefits of social support for PTSD symptoms may not last from one day to the next, but instead, accumulate over time. This information could be provided to patients to frame expectations regarding the impact of efforts to activate social support. Alternatively, the durability of social support might depend on the *nature* of the support provided (e.g., tangible assistance, emotional support) or the type or closeness of the relationship, rather than the perceived quality.

These results do not support the social selection model, which suggests that higher PTSD symptoms degrade social support over time (Kaniasty & Norris, 2008). Average levels of PTSD symptoms were not associated with day-to-day social support, and PTSD symptoms on a given day did not appear to degrade next-day social support. This relationship has been supported exclusively through longer-term longitudinal studies (e.g., Freedman et al., 2015;

Kaniasty & Norris, 2008; Shallcross et al., 2016). It is possible, then, that the social selection model explains this relationship over months or years, but not within a shorter time frame. Social support might be offered less over time in response to increases in symptoms for those with more severe symptoms, and might be less effective over time. Helping patients strategize about when and how to activate social support could thus be helpful. Finally, the relationship between social support and PTSD might be different for college students than for other populations, given that college students might be more likely to receive social support from friends (e.g., Lee & Goldstein, 2016; Lefkowitz, Boone, & Shearer, 2004) and to tell friends about SA (Fischer et al., 2003).

Strengths of this study include the microlongitudinal design. However, this study assessed emotional support with one question, and did not assess other types of social support or SA-specific social reactions. Given evidence for longitudinal associations between negative social reactions and PTSD (Littleton, 2010; Ullman & Peter-Hagene, 2014), social reactions should be explored in daily data. In addition, participants varied in the amount of time elapsed since their assault. There is evidence that the relationship between social support and PTSD symptoms changes as a function of time since trauma (Kaniasty & Norris, 2008; Ullman & Peter-Hagene, 2014). Although the models tested controlled for time since SA, we did not test whether relationships were moderated by time since SA. Future research should conduct prospective daily assessments after SA to clarify the role of time since trauma.

These findings suggest that activating social support for SA survivors with PTSD either by directly working with SA survivors to more effectively engage social supports or through intervening directly with social supporters could be useful in the treatment or prevention of PTSD (Paul & Sasson, 2013). Developing evidence-based strategies to provide social support in a consistent, ongoing manner could help supporters be maximally responsive and potentially counteract daily symptom fluctuations while increasing supporter self-efficacy. Indeed, PTSD treatments that incorporate supportive persons appear to effectively reduce PTSD symptoms (Billette, Guay, & Marchand, 2008; Monson & Fredman, 2012; Monson et al., 2012; Sautter, Glynn, Cretu, Senturk, & Vaught, 2015). Colleges could engage social supporters as part of a stepped-care approach to supporting trauma-exposed students (Kadison & DiGeronimo, 2004; Mowbray et al., 2006; Read, McGregor, Coggan, & Thomas, 2006).

In conclusion, increases in PTSD symptoms appear to promote social support from one day to the next, and general levels of social support appear to be protective against daily fluctuations in PTSD symptoms. These findings highlight the need for clinical interventions to maximize social support on a day-to-day basis.

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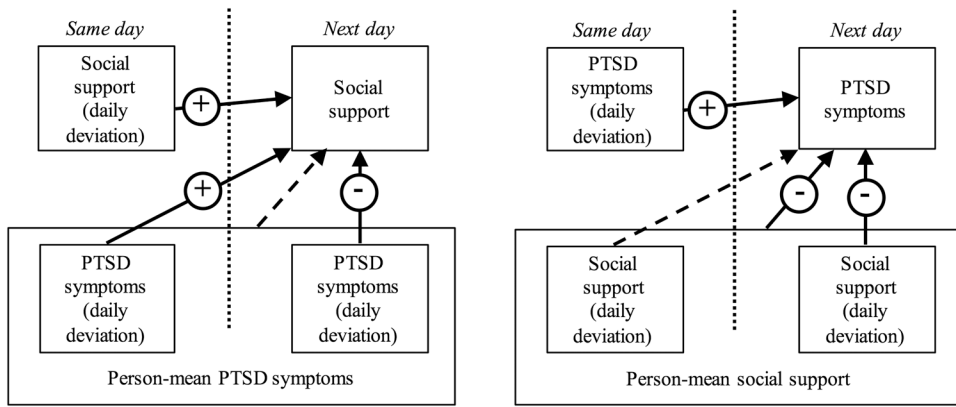


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**Figure 1.**  
Illustration of model results.

**Table 1**

Results from mixed models.

Variable	<i>B</i> ( <i>SE</i> )	<i>p</i>
<i>Model 1: Predicting next-day social support</i>		
Intercept	2.36 (0.42)	<0.0001
Same-day PTSD symptom deviation (person-mean centered)	0.07 (0.03)	0.02
Same-day social support deviation (person-mean centered)	0.32 (0.03)	<0.0001
Next-day PTSD symptom deviation (person-mean centered)	-0.08 (0.03)	0.004
Person-mean PTSD symptoms	-0.22 (0.12)	0.06
Time since assault	0.06 (0.10)	0.54
<i>Model 2: Predicting next-day PTSD symptoms</i>		
Intercept	2.57 (0.35)	<0.0001
Same-day PTSD symptom deviation (person-mean centered)	0.10 (0.01)	<0.0001
Same-day social support deviation (person-mean centered)	0.01 (0.01)	0.53
Next-day social support deviation (person-mean centered)	-0.04 (0.01)	0.005
Person-mean social support	-0.21 (0.10)	0.03
Time since assault	-0.03 (0.09)	0.74